VALID UNTIL 5/4/07

APPENDIX 9 - MARINE VESSELS

Below is additional information pertaining to the Marine Vessel category under AQMD's FY 2007 Carl Moyer Program (CMP). All information in Program Announcement (PA) #PA2007-08 and this Appendix apply. For additional detail regarding this program category, refer to CARB's 2005 CMP Guidelines. In the case of any conflict between CARB guidelines and AQMD criteria, the more stringent criteria will prevail.

It is the Applicant's responsibility to check with AQMD's CMP web page for program clarifications, changes and updates. This page may be accessed by clicking the link on AQMD's home page at http://www.aqmd.gov/tao/implementation/carl_moyer_program_2001.html.

CARB MOYER PROGRAM RESOURCES

Applicants are highly encouraged to review CARB guidelines for additional requirements of the CMP. CARB guidelines are incorporated into AQMD's Moyer Program by reference. 2005 CARB guidelines may be downloaded from:

http://www.arb.ca.gov/msprog/moyer/guidelines/revisions05.htm

On this web page, there are links to the four parts of the CARB 2005 CMP guidelines. These parts are described below for easy reference.

- Part I provides the Executive Summary, Program Overview and Administrative Requirements primarily applicable to air districts) for CARB's Carl Moyer Program. The link to Part I is http://www.arb.ca.gov/msprog/moyer/guidelines/2005_Carl_Moyer_Guidelines_Part1.pdf

- Part II provides the Project Criteria for each program category. The link to Part II is http://www.arb.ca.gov/msprog/moyer/guidelines/2005_Carl_Moyer_Guidelines_Part2.pdf

- Part III provides the Agricultural Assistance Program guidelines. Link to Part III at

http://www.arb.ca.gov/msprog/moyer/guidelines/2005_Carl_Moyer_Guidelines_Part3.pdf

- Part IV is the Appendices section of the guidelines. The link to Part IV is http://www.arb.ca.gov/msprog/moyer/guidelines/2005_Carl_Moyer_Guidelines_Part4.pdf . This section includes the following Appendices.

    - Appendix A – Acronyms
    - Appendix B – Tables for Emission Reduction and Cost-Effectiveness Calculations—see Table B18 for Marine Emission Factors
    - Appendix C – Cost-Effectiveness Calculation Methodology—see
    - Appendix D – Example Calculations—see Section IX for examples of marine vessel cost-effectiveness calculations
    - Appendix E – Description of Certification and Verification Executive Orders
    - Appendix F – Retrofit Emission Control Strategies
    - Appendix G – Description of Functional Equivalency of Non-Original Equipment Manufacturer Repowers and Rebuilt Engines for use in Repowers

HIGHLIGHTS FOR 2007

This chapter presents program criteria for marine vessel projects, and provides an overview of types of marine vessels, current emission control requirements, and available emission reduction technologies. The chapter also expands eligibility for Carl Moyer Program marine vessel projects to marine vessels with wet exhaust systems, and utilizes a single set of emission factors for propulsion and auxiliary engines, consistent with federal emission standards.

- Under CARB's 2005 CMP Guidelines, marine vessels eligible for funding include harbor craft and oceangoing ships, but exclude recreational vessels such as personal watercraft. AQMD has further restricted eligibility. Only marine vessels that operate within the ports are eligible for CMP funding. Marine vessels that generally operate outside of the ports such as, fishing, charter and dive boats are not eligible. Fixed route boats such as dinner cruise, harbor tours etc., may be considered on a case-by-case basis.

- Vessels with wet exhaust systems and eligible for CMP marine; however in order to ensure emission reductions projects on vessels with wet exhaust systems are not overstated, a conservative 20 percent NOx and PM emission reduction factor must be applied to both the baseline and reduced emission engine to reflect the overall lower emissions of wet exhaust systems.

- Beginning January 1, 2007, all harbor craft with diesel engines must use ARB low-sulfur diesel fuel to be eligible for Carl Moyer Program funding. Fuel Correction factors are already included in Table B-18.

- Although ARB's project cost-effectiveness limit is $14,300 per weighed ton of NOx, PM and ROG emissions reduced, the more stringent AQMD cost-effectiveness limit is **$5,000 per weighed ton of NOx, PM and ROG emissions reduced.** A four (4) percent capital recovery factor is used for the cost-effectiveness calculation.

- Cost-effectiveness calculations are based on particulate matter (PM10), oxides of nitrogen (NOx), and reactive organic gases (ROG). The formula is provided below. AQMD staff will calculate the NOx, PM and ROG emissions reductions and apply the formula during the evaluation process.

$$\text{Annualized Cost (\$/year)}$$

$$\text{NOx reductions + 20(combustion PM10 reductions) + ROG reductions (tons/year)}$$

- NOx reductions must not result in increases in PM or ROG emission relative to baseline levels.

- Applicants **must** provide **current** vendor quotes **obtained within the past 90 days** with their application to document the incremental cost of implementing the proposed technology. This will require individual quotes for both the baseline and low-emission project costs. Applicants can request funding up to the full differential cost between an optionally certified low-emission vehicle/engine/equipment and its new base standard emission equivalent; however, less may actually be awarded, depending on the results of the cost-effectiveness evaluation.

- Applicants **must** also provide documentation covering the past 24 months that justifies the activity level projected for the vehicles (i.e., mileage logs, hour-meter records, business records, fuel receipts, etc.).

- The new engine/equipment/vehicle must not have been purchased prior to the effective date of the contract.

- AQMD will conduct pre- and post-project inspections, as required.

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- All projects will be outfitted with an electronic monitoring unit (EMU). The cost of the unit is eligible be funded by the CMP program, but will be included in the cost-effectiveness determination.

- ARB staff is also developing a rule that may require the Best Available Control Technology (BACT), such as after-treatment devices or accelerated turnover, to reduce emissions from existing harbor craft fleets. The rule is scheduled to be considered for adoption by CARB in May 2007. If the rule is adopted, ARB shall publish an advisory describing how the rule impacts Carl Moyer Program funding eligibility.

- Particulate filters and diesel oxidation catalysts are eligible for funding. Because of the lack of retrofit devices verified for use on a marine vessel engine, a marine vessel retrofit device which is not yet verified may be considered for funding on a case-by-case basis if all other eligibility criteria are met.

- AQMD reserves the right to disqualify any application that does not comply with all applicable requirements including submission of a complete application package.

- Both diesel to diesel retrofits and conversions to alternative fuel are allowed. Projects where gasoline-fueled engines are replaced with new diesel engines or diesel engines are replaced with gasoline engines are not eligible for the CMP.

- If the horsepower rating of the new engine exceeds that of the existing engine by 25 percent or more, the difference in the rating will be taken into account in the emission reduction calculation.

- Funded projects must have at least 75 percent of the vessel's annual gallons consumed within the South Coast Air Basin.

- Replacement engines for repowers must meet current standards (Part IV, Appendix B, Table B-18, CARB CMP Guidelines).

- Pre- and Post-Inspection of all vessels/engines approved for funding is required as well as verification of engine destruction. Payment will be made only after all inspections are completed and engine/vehicle destruction is verified.

- All projects must be operational within eighteen (18) months of contract execution or by May 31, 2009, whichever is earlier.

EVALUATION METHODOLOGY

AQMD staff will evaluate all submitted proposals and make recommendations to the Governing Board for final selection of project(s) to be funded. Proposals will

be evaluated based on the cost-effectiveness of emissions (NOx + ROG + 20*PM) reduced on an equipment-by-equipment basis, as well as a project's "disproportionate impact" evaluation (discussed below). Be aware of the possibility that due to program priorities and/or funding limitations, project applicants may be offered only partial funding, and not all proposals that meet minimum cost-effectiveness criteria may be funded.

In compliance with AB 1390, Firebaugh, the FY 2007 CMP requires that at least 50 percent of the funds be spent in areas that are disproportionately impacted by air pollution. CARB has issued broad goals and left the details of how to implement this requirement to each air agency. In the South Coast Air Quality Management District, the disproportionately impacted areas are defined by a weighted formula that includes poverty level, particulate matter (PM) exposure and toxic exposure. The process is described below:

1. All projects must qualify for the CMP by meeting the cost-effectiveness limits established in the PA.

2. All projects will be evaluated according to the following criteria to qualify for Disproportionate Impact funding:

    a. Poverty Level: All projects in areas where at least 10 percent of the population falls below the Federal poverty level based on the year 2000 census data, will be eligible to be included in this category, and

    b. PM Exposure: All projects in areas with the highest 15 percent of PM concentration will be eligible to be ranked in this category. The highest 15 percent of PM concentration is 46 micrograms per cubic meter and above, on an annual average, or

    c. Toxic Exposure: All projects listed in the Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES II) report[1] as having a cancer risk of 1,000 in a million and above will be eligible to be ranked in this category.

    Data for the poverty level and PM and toxic exposures were obtained from the U.S. Census, the 1998 AQMD monitoring data and Mates II study respectively.

3. Fifty percent of the funding available for this PA will be allocated among proposals located in disproportionately impacted areas. If the funding for disproportionately impacted areas is not exhausted with the outlined methodology, then staff will return to the Governing Board for direction. If funding requests exceed 50 percent of the total available funding, then all

[1] Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES II), SCAQMD, March 2000.

qualified projects will be ranked based on their disproportionate impact. Each project will be assigned a score that is comprised of 40 percent for poverty level, and 30 percent each for PM and toxic exposures. Proposals with the highest scores will receive funding until 50 percent of the total funding is allocated.

All the proposals not awarded under the fifty percent disproportionate impact funding analysis will then be ranked according to cost-effectiveness, with the most cost-effective project funded first and then in descending order for each funding category until the remainder of the Moyer Funds are exhausted. Some projects that exceed the cost-effectiveness ceiling may receive partial funding, depending on their rankings.

ELIGIBLE COSTS

Eligible project costs (i.e., costs for which Moyer funding is requested) are limited to the incremental cost of a project to implement the reduced emission technology. Operation and maintenance costs are not eligible for CMP funding. A electronic monitoring unit (EMU) must be installed for marine category projects. The cost of the system is also eligible for CMP funding. This cost will be added during the project evaluation period and does not need to be included in the application. However, this added cost of the EMU will be added to the total grant cost for the purpose of calculating a project's overall cost-effectiveness, even though the EMU unit will be purchased by the AQMD directly.

PAYMENT TERMS

Twenty percent of the funds will be withheld for marine vessel projects, to be remitted annually on a sliding scale. Upon receipt of the annual report, the twenty percent withhold will be decreased according to the following:

Year 1	15% withhold
Year 2	10% withhold
Year 3	7% withhold
Year 4	0% withhold

REPORTING AND MONITORING

During the project life, the AQMD has the authority to conduct periodic checks or solicit operating records from the applicant that has received Moyer funds for each retrofitted or repowered marine engine. Project life is the number of years used to determine the cost-effectiveness. All equipment must operate in the AQMD for this full project life. Records must contain, at minimum the following:

- marine vessel identification numbers
- retrofit hardware model and serial numbers

- nautical miles traveled in the AQMD and California coastal waters
- estimated fuel consumption in AQMD coastal waters
- estimated hours of operation in the California and AQMD coastal waters
- and maintenance and repair dates (or any servicing information).

Records must be retained and updated throughout the project life and made available for AQMD inspection. The AQMD and/or ARB shall conduct periodic reviews of each project's operating records to ensure that the engine is operated as stated in the program application.

FUEL CONSUMPTION DOCUMENTATION

As noted earlier, applicants basing their project on fuel consumption are required to submit with their application receipts for the most recent 24 months to document fuel consumption of the project vessel(s). These fuel receipts should include the date of purchase and the number of gallons purchased. The total of the fuel receipts must match the fuel consumption listed on the project application. The applicant should indicate how the fuel use should be divided between main and auxiliary engines. Ten percent of the annual fuel will be allocated to the auxiliary engines if no other information is provided.

PROJECT LIFE

As discussed above, a key parameter in the determination of a project's emission reduction benefit is its project life. The acceptable maximum life for calculating the project benefits of on-road vehicle projects is summarized below in Table 9.1. Applicants must provide documentation to justify a longer project life.

Table – 9.1 Default Project Life for Marine Vessels

Category	Acceptable Life
Category 1 Engines	16 years
Category 2 Engines	23 years
Auxiliary Engines (Categories 1 or 2)	17 years

COST-EFFECTIVENESS EVALUATION DISCUSSION

Cost-effectiveness calculations are based on particulate matter (PM10), oxides of nitrogen (NOx), and reactive organic gases (ROG). The new formula established by CARB is highlighted above. Activity levels may use hours of operation or fuel consumption but documentation in the form of fuel receipts or meter readings must be provided. AQMD staff will calculate the NOx, PM and ROG emissions reductions and apply the formula during the evaluation process. Only CMP funds are to be used in determining cost-effectiveness[2]. The one-time incentive grant

[2] Unless the AQMD "buys down" the cost of the project by adding additional funding, in which case the total grant funding amount should be used for the cost-effectiveness calculation.

amount is to be amortized over the project life (which is also the contract term) at a discount rate of 4 percent. The amortization formula (given below) yields a capital recovery factor (CRF), which, when multiplied by the initial capital cost, gives the annual cost of a project over its project term.

$$CRF = [(1 + i)^n (i)] / [(1 + i)^n - 1]$$

where

i = discount rate (4 percent)
n = project life (at least 3 years)

Table 9.2 lists the CRF for different project lives using a discount rate of 4 percent. Cost-effectiveness is determined by dividing the annualized costs of a project by the annual weighted emission reductions offered by the project.

Table 9.2 – Capital Recovery Factors (CRF) for Various Project Lives At 4 Percent Discount Rate

Project Life	CRF
3	0.360
4	0.275
5	0.225
6	0.191
7	0.167
8	0.149
9	0.134
10	0.123
11	0.114
12	0.107
13	0.100
14	0.095
15	0.090
16	0.086
17	0.082
18	0.079
19	0.076
20	0.074

Below are excerpts[3] from CARB's CMP Guidelines (Chapter 9 – Marine Vessels) pertinent to the AQMD PA #2007-08.

Both propulsion and auxiliary marine vessel engines are eligible for Carl Moyer Program funding. For the purpose of the Carl Moyer Program, a propulsion engine is defined as an engine that powers the vessel through the water or

[3] The information below is excerpted from CARB's 2005 CMP Guidelines. Not all sections of the guidelines were pasted here, but CARB numbering was retained to stay consistent with CARB Guidelines for easy cross-reference.

directs the movement of the vessel.

Auxiliary engines are used to power on-board equipment such as electrical lights, refrigeration units, and radios. For the purposes of the Carl Moyer Program, an auxiliary engine is defined as a marine vessel engine that is not the propulsion engines whose fuel, cooling, or exhaust systems are an integral part of the vessel or require special mounting hardware. All other auxiliary engines are considered portable and may be eligible for funding under the Off-Road Compression Ignition project criteria (See Chapter 5).

POTENTIAL PROJECT TYPES

For additional information on oceangoing vessel emission standards please consult, the ARB Moyer Program Guidelines Part II, Chapter 9,Section **IV,** Potential Projects**.**

Marine vessel projects that could potentially qualify for incentive funding under the Carl Moyer Program for marine vessels include the purchase of a new reduced emission marine vessel, a marine vessel repower, a marine vessel retrofit, or shore-power projects.

A. New Purchase

New marine vessels with propulsion engines certified to U.S. EPA's Blue Sky Series emission limits are eligible for Carl Moyer Program funding. While no marine vessel propulsion engines currently meet the Blue Sky Standards, engines meeting certification emission limits may become commercially available as engine technologies continue to advance.

B. Repower

To date, most Carl Moyer Program marine vessel projects have involved replacing or "repowering" an old harbor craft engine with a newer, cleaner engine. Most of these projects have involved replacing an older mechanical engine with a newer electronically controlled engine. For all Carl Moyer Program engine repowers, the replacement engine certified emission rate must provide at least a 15 percent NOx reduction relative to the baseline engine. If the replacement engine is significantly modified or re-configured in any way during the project life, emissions testing must be conducted to determine its new emission rates.

Engine repowers for marine vessels equipped with wet exhaust system are eligible for Carl Moyer Program funding. Since a wet exhaust system reduces air emissions from both the baseline and the newer, cleaner engine, repower projects on marine vessels with these systems may result in slightly fewer emission reductions compared to repowers of vessels with dry exhaust. An analysis of emissions data from California harbor craft indicates wet exhaust systems reduce PM and NOx emissions from propulsion and auxiliary engines by 1 to 19 percent. In order to ensure emission reductions projects on vessels with wet exhaust systems are not overstated, a conservative 20 percent NOx and PM

emission reduction factor must be applied to both the baseline and reduced emission engine (See marine vessel example calculation 3 in Appendix D for more information). The Carl Moyer Program does not provide funding to repair or replace any component of the wet exhaust system itself.

C. Retrofits

Potential marine vessel retrofit projects involve the addition of an ARB-verified diesel particulate filter, diesel oxidation catalyst, or selective catalytic reduction technology. A retrofit device must typically be verified by ARB in order to be considered for funding. To date, however, very few retrofit technologies have been verified to reduce emissions from marine vessels.. Because of the lack of retrofit devices verified for use on a marine vessel engine, a marine vessel retrofit device which is not yet verified may be considered for funding on a case-by-case basis. Applicants for funding on a case-by-case basis must meet all applicable project criteria.

In recent years, engine manufacturers have also developed engine remanufacture retrofit kits certified by the IMO to meet IMO NOx emission standards. To be eligible for Carl Moyer Program funding, a remanufacture retrofit kit must be certified by the ARB, U.S. EPA, or the IMO to reduce emissions from the project vessel engine. NOx emissions must be reduced by at least 15 percent to take credit for NOx emission reductions. Remanufacture kits which employ fuel injection timing retard are only eligible for funding if it is demonstrated that PM emissions from the project vessel shall not increase. If the retrofit kit certification does not specify the percent reduction or emission rate for NOx, PM, or ROG, emissions testing must be conducted annually for the life of the project to ensure the retrofit does not increase emissions from these individual pollutants. Individual engine parts or other vessel components are not eligible for funding unless as part of a complete certified engine remanufacture retrofit kit.

D. Marine Shore-Side Provided Power

The largest emission source at ports is marine vessels. One strategy for reducing marine vessel emissions is “cold ironing” where ships plug into shore-side power while docked, rather than continuously running their diesel engines to generate electricity. Cold-ironing requires the proper electrical supply connections from the shore — lines, transformers, switching gear, cables, etc. — and the necessary hook-ups on the ship.

Because each cold ironing project will be unique, ARB staff is proposing that they be considered for grant funding on a case-by-case basis. Applications will be evaluated based on factors including, but not limited to, frequency and duration of port visitations, energy usage at the dock, seasonal operating variances and regularity of travel routes. Shore power projects to reduce marine vessel auxiliary engine emissions may also be eligible for Carl Moyer Program funding and are discussed in Chapter 12 of the 2005 CMP Guidelines.

Projects to replace gasoline-fueled engines with diesel engines are not eligible for funding.

E. On-Board Testing

Because of the high variability in marine engine emission rates, districts may utilize on-board testing to determine baseline marine vessel emission rates for the purposes of Carl Moyer Program cost-effectiveness calculations, if testing follows approved test procedures. Constant speed propulsion engines should be tested on the International Organization for Standardization's (ISO) 8178-E2 test cycle and constant speed auxiliary engines on the ISO 8178-D2 test cycle. Variable speed auxiliary engines and variable speed propulsion engines used with variable-pitch propellers (or electrically coupled propellers) should be tested on the ISO 8178-C1 duty cycle. All other engines, including those used with fixed-pitch propellers, should be tested on the ISO 8178-E3 Marine Propeller Law Heavy Duty operating cycle. When on-board testing is conducted in accordance with approved procedures, these results must be used when calculating emission reductions. The maximum acceptable values of baseline NOx, ROG, and PM emission factors derived from in-situ source testing are 20 g/bhp-hr, 2.0 g/bhp-hr, and 1.0 g/bhp-hr, respectively. If emission testing is not feasible, the applicant can use the default baseline emission factors presented in Appendix B.

PROJECT CRITERIA

These criteria provide the minimum requirements for all Carl Moyer Program marine vessel projects. Participating districts retain the authority to impose additional requirements in order to address local concerns.

- Emission reductions obtained through Carl Moyer Program projects must not be required by any federal, state or local regulation, memorandum of agreement/understanding with air quality regulators, settlement agreement, mitigation requirement, or other legal mandate. Inclusion in a port emission reduction plan, lease agreement, or other voluntarily adopted strategy does not exclude a marine vessel project from Carl Moyer Program funding eligibility, if such project is not otherwise required.
- No emission reductions generated by the Carl Moyer Program shall be used as marketable emission reduction credits, or to offset any emission reduction obligation of any person or entity.
- No project funded by the Carl Moyer Program shall be used for credit under any federal or state emission averaging banking and trading program.
- Marine vessels and engines utilizing an alternative compliance plan to comply with a rule, requirement, or other mandate shall not be eligible for Carl Moyer Program funds.
- A marine vessel receiving any type of emission reduction credit or offset is

ineligible for Carl Moyer Program funding.

- Beginning January 1, 2007, all harbor craft with diesel engines must use CARB low-sulfur diesel fuel to be eligible for Carl Moyer Program funding. Emission reductions and costs associated with use of CARB low-sulfur diesel shall not be included in project cost-effectiveness calculations.
- Only marine vessel engines with a United States Coast Guard Documentation Number are eligible for Carl Moyer Program funding. This information must be included in the project application. Information is available at the following website: http://www.st.nmfs.gov/st1/commercial/landings/cg_vessel2.html
- Projects must meet a cost-effectiveness of $5,000 per weighed ton of NOx + ROG + combustion PM10 reduced calculated in accordance with the CARB cost-effectiveness methodology.
- Carl Moyer Program grants can be no greater than a project's incremental cost. The incremental cost is the cost of the project minus the baseline cost. The incremental cost shall be reduced by the value of any current financial incentive that reduces the project price, including tax credits or deductions, grants, or other public financial assistance.
- The contract term for all marine vessel projects must be equivalent to the project life. The project life is defined as the number of years used to evaluate project cost-effectiveness.
- Projects must have a minimum project life of three years. ARB may approve shorter project life on a case by case basis. Projects with shorter lives may be subject to additional funding restrictions, such as a lower cost-effectiveness limit or a project cost cap.
- The maximum project life for marine vessel projects (equivalent to the average engine life reported by U.S. EPA) is as follows:

	Maximum Project Life
Engine displacement <5.0 liter/cyl.	16 years
Engine displacement >5.0 liter/cyl.	23 years
Auxiliary engines	17 years

- Only marine vessel activity in California waters may be used to determine project emission reductions. For the purposes of the Carl Moyer Program, California water boundaries are based upon each air districts' emission inventory boundary. If a local district has not established an emission inventory boundary, the ARB and district staff will determine an appropriate boundary for use in project evaluation.
- Marine vessels which are not self-propelled (e.g. barges) are not eligible for Carl Moyer Program funding.

- Project marine vessels must be equipped with a functioning tamper proof electronic monitoring unit (EMU) to track activity and geographic location. The EMU must be turned on and functional when the project engine is running for the life of the project, to record all vessel trips and activity. If the EMU is battery powered, the battery life must be long enough to ensure the EMU is charged and functional each time the project vessel is operated. Electronic information from the EMU regarding total and percent of activity (fuel use or hours of operation) within the air district coastal boundary and California Coastal Waters must be reported to air district annually for the project life. The cost of a new unit may be included in the Carl Moyer Program grant and in the project cost-effectiveness calculations if not required by any rule, statute, MOU, or other mandate.

- Carl Moyer Program funds cannot be expended on costs for labor or parts used during routine maintenance.
- Funding is not available for projects where spark-ignition engines (i.e. natural gas or gasoline, etc.) are replaced with new diesel engines.
- Engines on marine vessels with wet exhaust systems are eligible for Carl Moyer Program funding if the project vessel meets all other applicable program requirements. The wet exhaust systems themselves are not eligible for Carl Moyer Program funding. A wet exhaust factor of 0.80 must be applied to the baseline and reduced emission propulsion and auxiliary engine emission calculations for all projects on vessels with wet exhaust systems.
- Potential projects which fall outside of these criteria may be considered on a case by-case basis if evidence provided by the air district suggests potential surplus, real, quantifiable, and enforceable emission reduction benefits.
- Air districts must consult with ARB staff to determine eligibility of all projects considered for funding on a case-by-case basis. All projects considered for funding on a case-by-case basis must receive ARB approval prior to receiving program funding.
- A new marine vessel must meet the U.S. EPA Blue Sky Series Standards to be eligible for funding. All propulsion and auxiliary engines on new marine vessel purchase projects must also achieve at least a 30 percent NOx emission reduction from baseline levels.
- A replacement engine or retrofit must provide a 15 percent minimum NOx emission reduction relative to the baseline engine.
- A retrofit device must be ARB-verified to reduce emissions from the project engine in order to be eligible for funding. Non-verified technologies may be considered on a case by case basis if: 1) an application for verification of the retrofit or add-on equipment on the proposed engine category is pending, 2) the retrofit or add-on equipment has been verified or certified by ARB for use on a similar engine category, or 3) project

emission benefit, durability, and applicability have been or shall be demonstrated through in-situ testing.

- Retrofits considered for funding on a case-by-case basis must be clearly demonstrated to achieve the expected emission reductions for the full project life, function properly under the project vessel engine duty cycle, and to not harm the vessel engine.
- To be eligible for Carl Moyer Program funding, a remanufacture emission kit must be certified by the ARB, U.S. EPA, or the IMO to reduce emissions from the project vessel engine. NOx emissions must be reduced by at least 15 percent to take credit for NOx emission reductions. Engine remanufacture kits must also not increase NOx, PM, or ROG emissions from the project vessel. If the engine certification does not specify a specific percent reduction or emission rate for NOx, PM, or ROG, emissions testing must be conducted annually for the life of the project to ensure the remanufacture does not increase emissions from these individual pollutants. Individual engine parts or other vessel components are not eligible for funding unless as part of a complete certified engine remanufacture kit.
- Scrap requirements are described in the 2005 Carl Moyer Program Guidelines, Part I, Chapter 2: Administration of the Carl Moyer Program

COST-EFFECTIVENESS EVALUATION DISCUSSION

To receive Carl Moyer Program funding, each project must meet the maximum cost-effectiveness threshold of $5,000 per weighted ton of covered pollutants reduced. Only funds provided by the Carl Moyer Program and local district matching funds are to be used in determining cost-effectiveness. Emission reduction benefits represent the difference in the emission levels of the existing baseline technology relative to the newer, reduced-emission technology. Baseline and reduced engine emission factors are listed in Table B-18 in CMP Guidelines, Appendix B. Harbor craft emission factors represent off-road engine emission factors for uncontrolled engines, and harbor craft emission standards for controlled engines. Fuel correction factors have been applied to all emission factors.

A detailed description of how to calculate cost-effectiveness can be found in CMP Guidelines, Appendix C. Marine vessel emission reduction calculations will use either the fuel- or hour-based formula. Examples of cost-effectiveness calculations can also be found in CMP Guidelines, Appendix D.